



Nautical Deck Queries

1. If your vessel has a list to port due to negative GM and off-center weight, the first corrective measure you should take is to _____.

Note: A negative metacentric height or "negative GM" is the result of an unstable condition when the center of gravity is above the vessel's metacenter. Action must be taken to reestablish stability either by removing weight from above the center of gravity or by adding weight below the center (or both) before continuing with cargo operations.

- A. move port-side main-deck cargo to the starboard side

Incorrect: Moving weight horizontally will initially lessen the list but will contribute nothing to improving the ship's stability. Because the ship's center of gravity is above its metacenter, the ship will continue to remain unstable and list suddenly to starboard as soon as the relocated mass passes the vessel's longitudinal centerline.

- B. fill the starboard double-bottom

Correct Answer: By filling a double-bottom tank, the ship's center of gravity is being lowered as weight is being added as low as possible. The most desirable action to take immediately is to ballast all double-bottom tanks that are empty until positive stability is established.

- C. pump water from the port double-bottom to the starboard double-bottom

Incorrect: This action is essentially the same as that in choice "A." Shifting weight from port to starboard will not correct the ship's instability.

- D. pump water from the port double-bottom over the side

Incorrect: The removal of weight from below the center of gravity will increase instability.

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2. Which type of GPS receiver has at least four channels to process information from several satellites simultaneously?

Note: A navigational receiver aboard a vessel is able to track six to 10 GPS satellites simultaneously. There are four satellites, in each of six orbits, broadcasting navigational data. At the time of this writing, the GPS "constellation" consists of 29 satellites because five of the orbits contain a new satellite for the replacement of an older one.

- A. Sequential

Incorrect: The original GPS receivers of the 1980s were "sequential," meaning that the receiver had to receive input, then switch reception in sequential order from one satellite to the next as only one channel was available. These receivers were only able to track the satellites "within view" through one receiving cycle at a time, resulting in a "slow" position determination. Because these receivers were hampered by the relatively time-consuming process of switching satellite reception, they were not useful to the aviation industry. The main reason for this initial design was to minimize cost and power consumption during the initial phases of GPS development. Sequential receivers are no longer manufactured.

- B. Continuous

Correct Answer: The significance of the "four channels" referred to in this question is that this is the minimum number of satellites from which the receiver must acquire information in order to provide the user with an accurate position. Since six to 10 satellites are being monitored simultaneously, there is no time delay required to switch from one satellite to another in sequential order. Quality GPS receivers, such as those used for maritime navigation, are now designed with at least 12 channels. It is unnecessary for GPS receivers to be designed with more than 12 channels as no more than 10 satellites may be "visible" at any one time.

- C. Multiplex

Incorrect: Multiplex reception is an improvement over the original sequential receiver. The receiver must still switch from one satellite to another, but now accomplishes this at a much faster rate of (typically) 50 Hertz, versus the 5 to 10 Hertz rate of the original "sequential" receivers. A multiplex receiver acquires navigational data from one satellite for a predetermined "slice of time," then switches to another satellite, for the same "slice of time," to receive additional navigational data. If it is able to perform the switching fast enough, the receiver seems to be tracking all of the satellites simultaneously. The hand-held receivers designed in the mid to late 1990s are multiplex, and many of them are still being used.

- D. None of the above

Incorrect: Choice "B" is correct.

3. Before operating a non-oceangoing ship greater than 100 gross tons, it must have a fixed piping system to discharge oily mixtures ashore. This system must include _____.

Note: Oceangoing ships of 400 gross tons and greater are required to have this equipment. (33 CFR 155.360)

A. approved oily-water separating equipment

Incorrect: Although many small ships operating on U.S. Inland Waters are equipped with oily-water separators, this equipment is not required on a non-oceangoing vessel.

B. a fixed or portable containment system at the shore connection

Incorrect: A containment system is not required at the shore connection to the oily-water discharge piping. This must not be confused with the required containment on deck at the cargo piping shore connection (33 CFR 155.310) or the required containment under the fuel tank vent goosenecks during fueling operations. (33 CFR 155.320)

C. a spare pump in case the main pump is inoperative

Incorrect: For the purpose of discharging an oily mixture ashore, only one pump is required, even if "good engineering" recommends two pumps.

D. at least one outlet accessible from the weather deck

Correct Answer: The required piping system must have at least one outlet fitted with a stop valve accessible for connecting a discharge hose from the weather deck. This connection must be compatible with the facilities in the vessel's area of operation. (33 CFR 155.410)

4. In a tropical cyclone in the southern hemisphere, a vessel hove-to with the wind shifting clockwise would be _____.

Note: Wind blows from an area of high pressure toward—or into—an area of low pressure. Because of the effect of the earth's rotation, the wind direction is diverted to the left in the southern hemisphere (right in the northern hemisphere) as viewed from above. Therefore, wind circulates clockwise around a "Low" in the southern hemisphere. Don't confuse this clockwise cyclonic rotation with the direction that the wind is "shifting," as observed from aboard a vessel experiencing the cyclone. Shifting is defined as the gradual, progressive change in wind direction, as the cyclone approaches and passes a vessel. By monitoring this directional change, in addition to monitoring the barometer, mariners can determine their location relative to the cyclone's center. When a vessel is ahead of an approaching storm, the barometer will be falling, and as the storm passes, the barometer will begin rising. The direction of cyclonic rotation can never change from clockwise to counterclockwise, or vice-versa, because a tropical cyclone cannot cross the equator. Often, the best possible action is to hold the ship with its bow into the wind (hove-to) to minimize rolling. The condition to be avoided is having either (port or starboard) side to the wind and seas (broach-to).

A. ahead of the storm center

Incorrect: The wind direction will remain constant if the vessel is on the storm's track.

B. in the dangerous semicircle

Incorrect: If a ship in the southern hemisphere is in the dangerous semicircle, the wind will be shifting counterclockwise as the storm approaches and passes. This semicircle is the one to the left of the storm's track in the southern hemisphere versus the right in the northern hemisphere. The semicircles are named "dangerous" and "navigable" because of the difference in wind speed between them. For example, if the rotational wind speed is 80 knots, and the storm is moving at 20 knots along its track, the actual wind speeds in the dangerous and navigable semicircles are 100 and 60, respectively.

C. directly behind the storm center

Incorrect: The wind direction will remain constant if the vessel is on the storm's track.

D. in the navigable semicircle

Correct Answer: If a ship is coming into the navigable semicircle of a westbound approaching storm in the southern hemisphere, it will first encounter a southwesterly wind becoming westerly while the barometer is falling. Then, the wind will become northwesterly and the barometer will begin rising as the storm passes.